California Medicine

EDITORIAL

Biochemistry and Mental States

WITH THE INFORMED JUDGMENT that has characterized his work, Dr. Seymour Kety calls attention to one of the great frontiers of biomedical science in this issue. For the first time in history, science is beginning to make inroads on the biochemistry of behavior. Biochemical process relevant to consciousness, memory, thinking and emotional experience are now being identified. This is, for the most part, very recent work. Even today, the number of excellent scientists working in these areas is small but rapidly increasing. The potential importance of their work is very great.

In any young field, and especially one that touches human experience so intimately, the ratio of hypotheses to verified principles is bound to be high. In his judicious way, Dr. Kety helps us to sort these out. Some of the newer findings are remarkable. For instance, the old notion of the sleeping brain as inactive tissue must now give way. The sleeping brain has, in fact, greatly increased blood flow, sharply elevated temperature, and increased oxygen utilization during periods of rapid-eye-movement sleep. These are the same periods which are characterized by electrical activity of the cortex of an "activated" type, and which are specifically associated with dreaming.

In research on memory, claims have tended to outrun substantial findings; but recent work does point to the importance of protein synthesis in the brain for the long-term consolidation of memory —though not for the immediate acquisition of new information. A rather massive inhibition of protein synthesis is required to demonstrate these effects. It is remarkable that even in the face of such inhibition, new learning proceeds adequately —only retention is blocked. Thus, the biological basis of the distinction between short-term and long-term memory storage is beginning to emerge.

The severe thought disorder of schizophrenic behavior is a crucial area for scientific investigation. This is, after all, a common and severe disorder. Dr. Kety and his collaborators have served as a conscience for investigators of this problem. While most of the early hypotheses have proved inadequate, it is extremely interesting to note that they have served to stimulate basic research of great importance and general applicability—the elucidation of biogenic amine metabolism in the brain and other tissues. The role of disordered amine metabolism in schizophrenia is still far from clear, although worthwhile leads are currently being pursued. However, a genuinely "hot" area of investigation has emerged quite recently, centering on the role of biogenic amines in the regulation of mood and in the depressive disorders. These disorders certainly constitute an important problem in medical practice, not only in psychiatry but in a variety of fields.

Various lines of inquiry are converging to implicate the metabolism brain amines, especially norepinephrine, in experiences of depression and elation. Before long, we may well have a biochemistry of hope and despair. The implications of such research for relief of human suffering need hardly be emphasized.